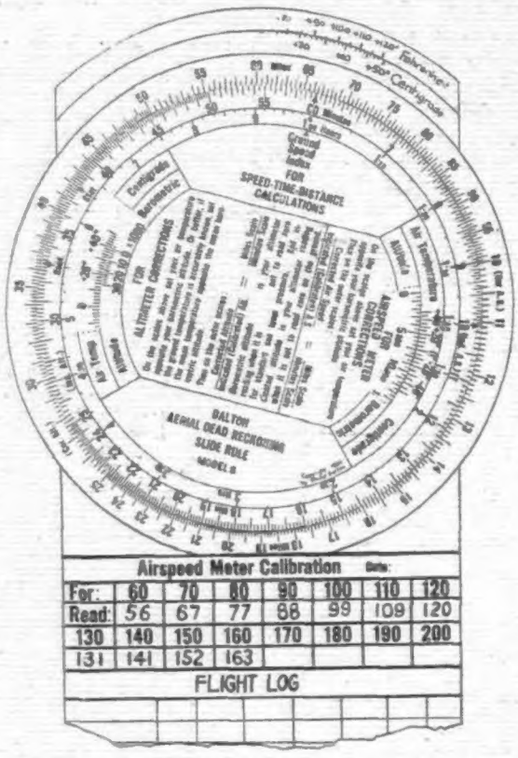
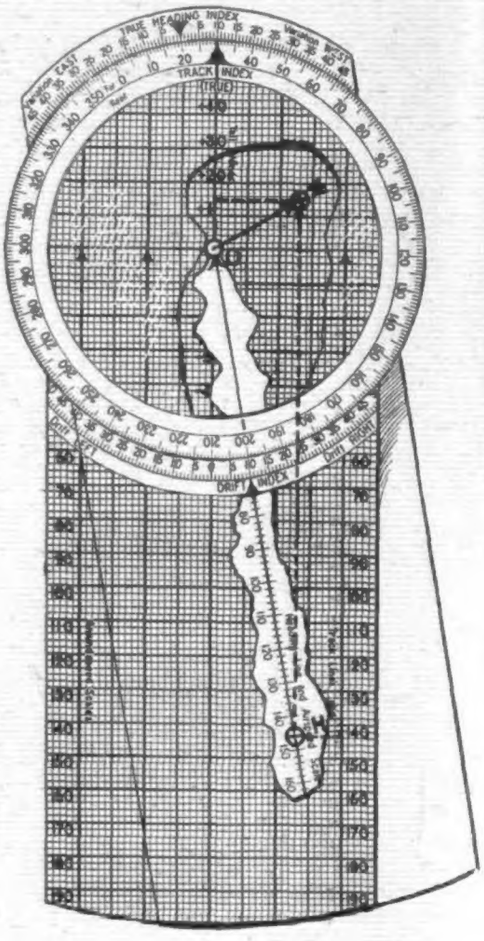
MORE MECHANICAL D/R

Using the Dalton Mark VII Computer : Multiple Calculations Made Easy

THE amateur pilot on his little excursions requires hardly more than an intelligently used proportional calculator for his exercises in dead reckoning, and the commercial pilot certainly should not need to be told about anything which is not entirely new in the way of calculating machinery. Nevertheless, there must be a number of pilots who take their navigation with sufficient seriousness and yet who do not have the chance of seeing any new computing machinery as it makes its appearance.

Of comparatively recent manufacture, at least in this country, the Dalton Computer, which is now used by Imperial Airways' pilots and, in a somewhat modified and involved form, by Service pilots, is a typical example of such modern machinery. It would be true to say that with this instrument anything from a plain drift allowance to the correction of indicated airspeed and/or altitude—which must be made in order that the simple initial calculation may be quite correct—can be carried out by the Dalton in little more than the time required to read this sentence. Certainly, and without exaggeration, it is the best implement of its kind to come my way. After practice work, lasting perhaps an hour or an hour-and-a-half and covering all the problems which are likely to be met in the ordinary course of navigation, this computer may be operated more quickly than any other such device which I have previously tried, and it can, if necessary, be worked accurately with one hand only.





These sketches show (left) the circular slide rule at the back of the Dalton Computer and (right) the side of the instrument used for normal plotting. The disc and the grid piece have been cut away and a simple vector diagram has been drawn to show the principle of operation.

The somewhat lengthy experimental period was explained in my case largely by the fact that it does not "manufacture" velocity triangles in quite the form with which we are familiar in the case of the ordinary C.D.C., and also by the sheer number of the different calculations which may be made. Furthermore, the explanatory booklet which has been produced by the manufacturers, Henry Hughes and Son, Ltd., has, to some extent, apparently, been reprinted from similar material produced in the country of its origin, the U.S.A., where the problems of navigation are possibly attacked from a somewhat different angle. However, once the simple basic principles have been grasped, the very complete markings and explanations on the instrument itself should effectively prevent any possibility of future misunderstanding.

Interception Problems

Briefly, the face of the calculator, consisting of a rotating bearing disc, of a rectangular transparent grid piece, and an almost plain white base, is used simply to produce vector diagrams with the magnetic variation allowed for on the true heading index at the top of the instrument. A suitably graduated line on the base piece acts as the compass course, while one or other of the marked lines on the grid-piece provides the necessary track line and ground-speed scale. The wind is drawn in with a pencil from the centre of the plotting disc in the direction in which it is blowing, i.e., in the reverse direction from that in which it is given in meteorological reports. This use of pencil marking has certain advantages, one of which is that the direction and speed of the wind, once graphically recorded, can remain on the disc during a day's flying and all other calculations are the work of a moment.

The double-drift type of problem, which involves the estimation of drift on two different headings and the consequent calculation of wind-speed and direction, can also be particularly quickly and accurately carried out, while interception problems, of a kind which I had never previously troubled to attempt, could be worked out in rather less than a minute. As a matter of interest and to check detailed accuracy, I drew four velocity triangles and two interception quadrilaterals to a very large scale, measured the results very carefully and afterwards carried out the same calculations on the Dalton. None of the figures obtained varied between the two by more than a degree or, at the most, by 2 m.p.h. Needless to say, these problems by no means exhaust the possibilities even of this side of the calculator.

On the other side there is the usual proportional calculator in what, to me, is a new and much-improved form. The scale is, in fact, continuous and the calculator is virtually a circular slide rule. No multiplication is necessary where figures higher than a certain limit are being used, and anything read off is correct, whatever the variation in proportion, except for the position, of course, of the decimal point. In addition, an inner circle of figures on the rotating disc gives the equivalent number of hours, starting at 60 minutes (or 1 hour) on the scale proper, and ending at ten hours. Inside the disc there are altitude and air-temperature scales which, when suitably adjusted in relation to one another, permit one to read off the true airspeed or altitude against those indicated on the instruments.

Below the calculator there are A.S.I. calibration tables to be filled in and space for a flight log, while above the disc is a Centigrade-Fahrenheit proportion scale. Any pencil marks made on either the plotting disc or on any part of the backpiece may either be rubbed or washed out. Inside the bearing scale of the plotting disc the necessary space is provided for permanent compass card corrections, in the case of a particular machine, and the actual compass course may therefore be read off against the magnetic variation mark without the need for any further corrections. The device is handled by Smiths Aircraft Instruments.

INDICATOR.

[We hope shortly to be able to publish a description of the new Dalton Model G Computer, which works on the same principles but is especially designed for very quick and accurate work with one hand.—ED.]